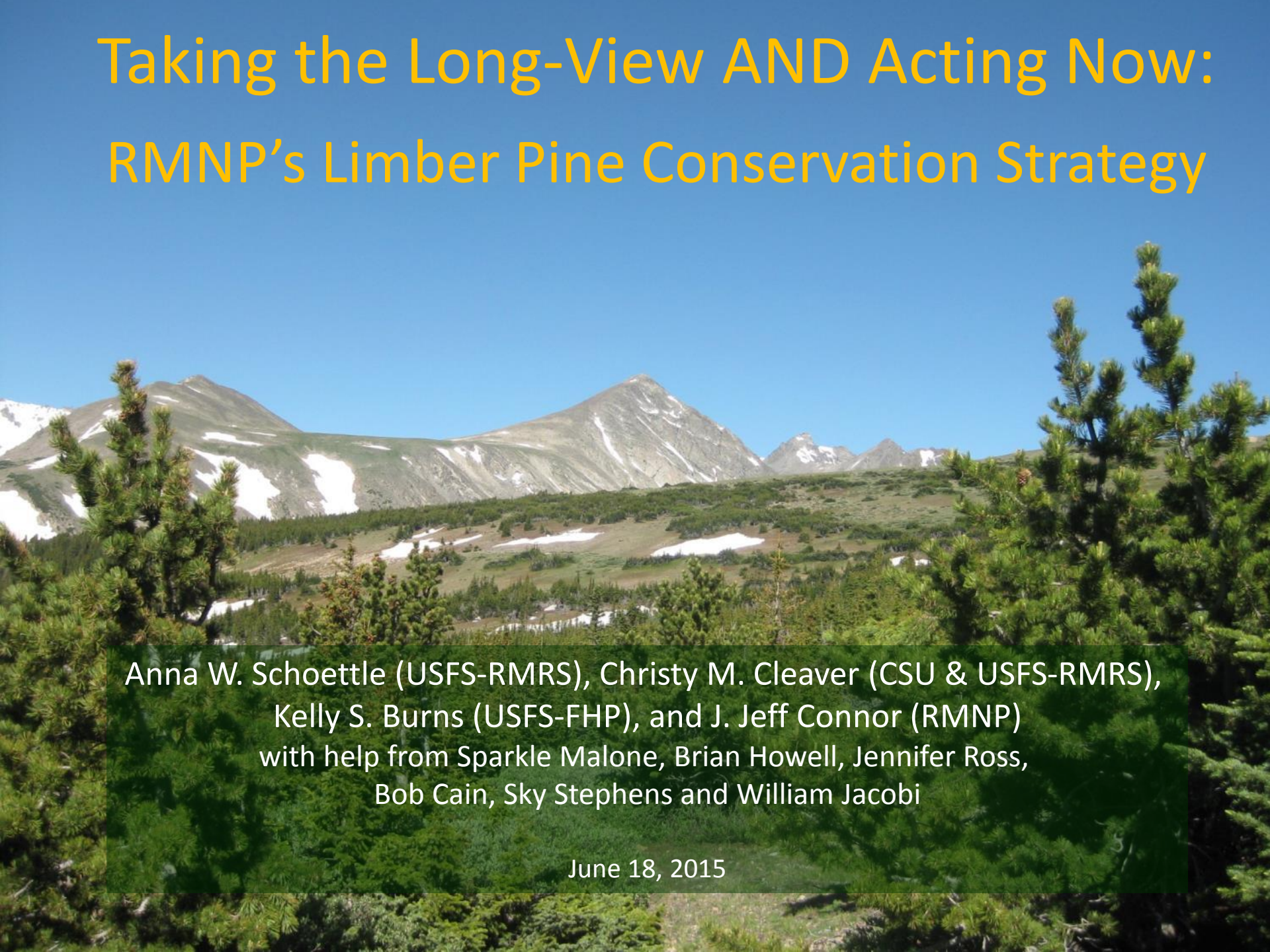
Taking the Long-View AND Acting Now:

RMNP's Limber Pine Conservation Strategy



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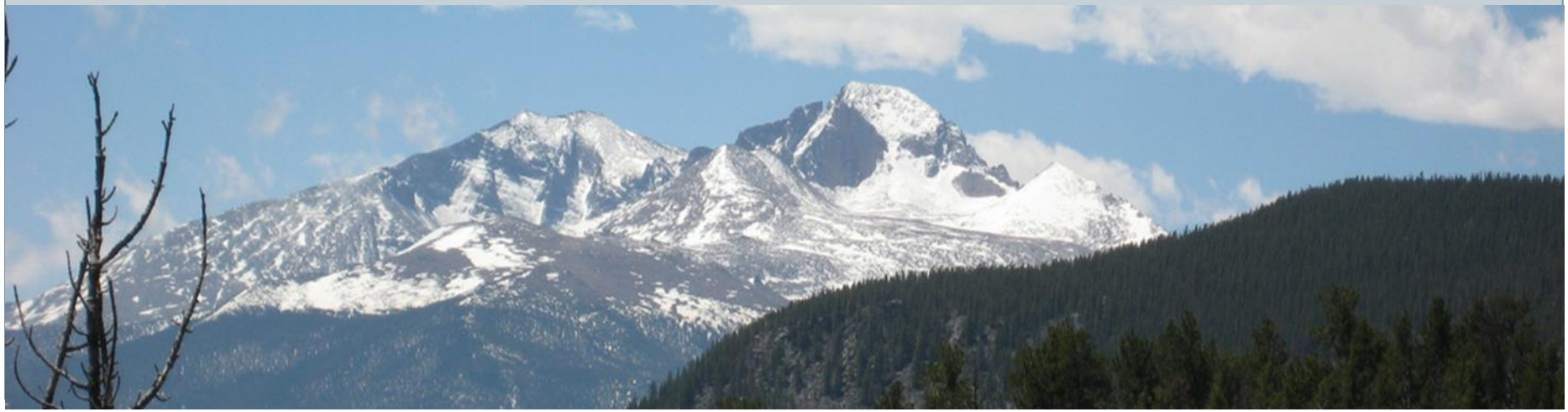
with help from Sparkle Malone, Brian Howell, Jennifer Ross,
Bob Cain, Sky Stephens and William Jacobi

June 18, 2015

Outline of the Presentation

1. High elevation five-needle pines
2. White pine blister rust (WPBR): a lethal non-native disease
3. Gaining the science foundation to conserve limber pine
4. Ecology and condition of limber pine in RMNP
5. Limber Pine Conservation Strategy for RMNP
6. Acting now to keep limber pine common in RMNP



Limber Pine and other High Elevation Five-Needle Pines

- Slow growing
- Long-lifespans
- Tolerant of harsh condition

Define the alpine treeline
Limit of where trees can grow

High Elevation Five-Needle Pines

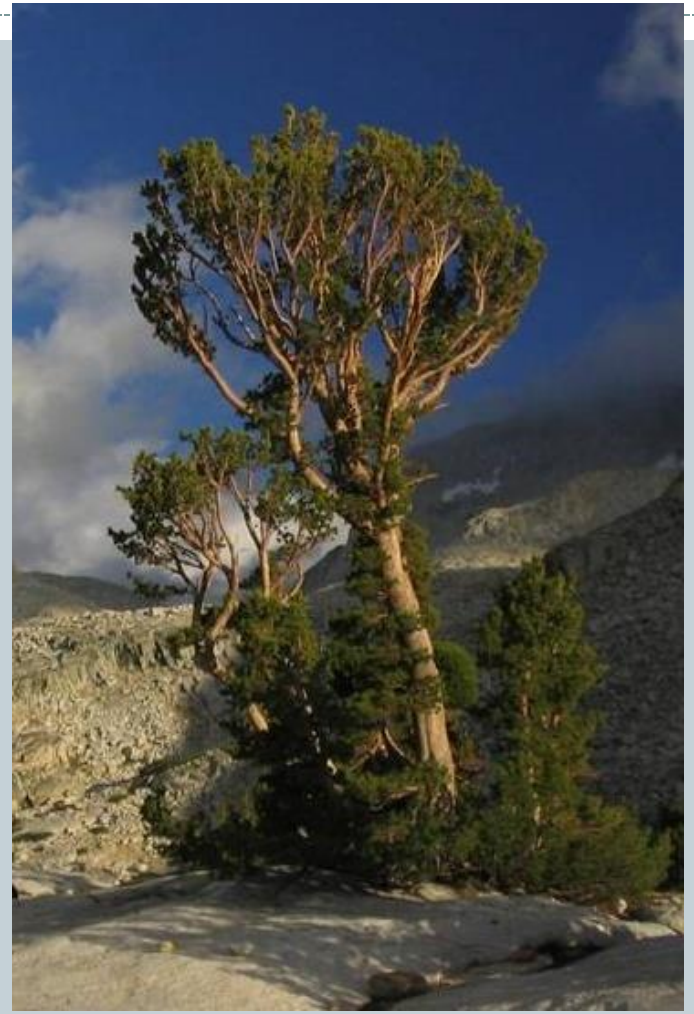
Rocky Mountain Bristlecone Pine

Limber Pine

Whitebark Pine

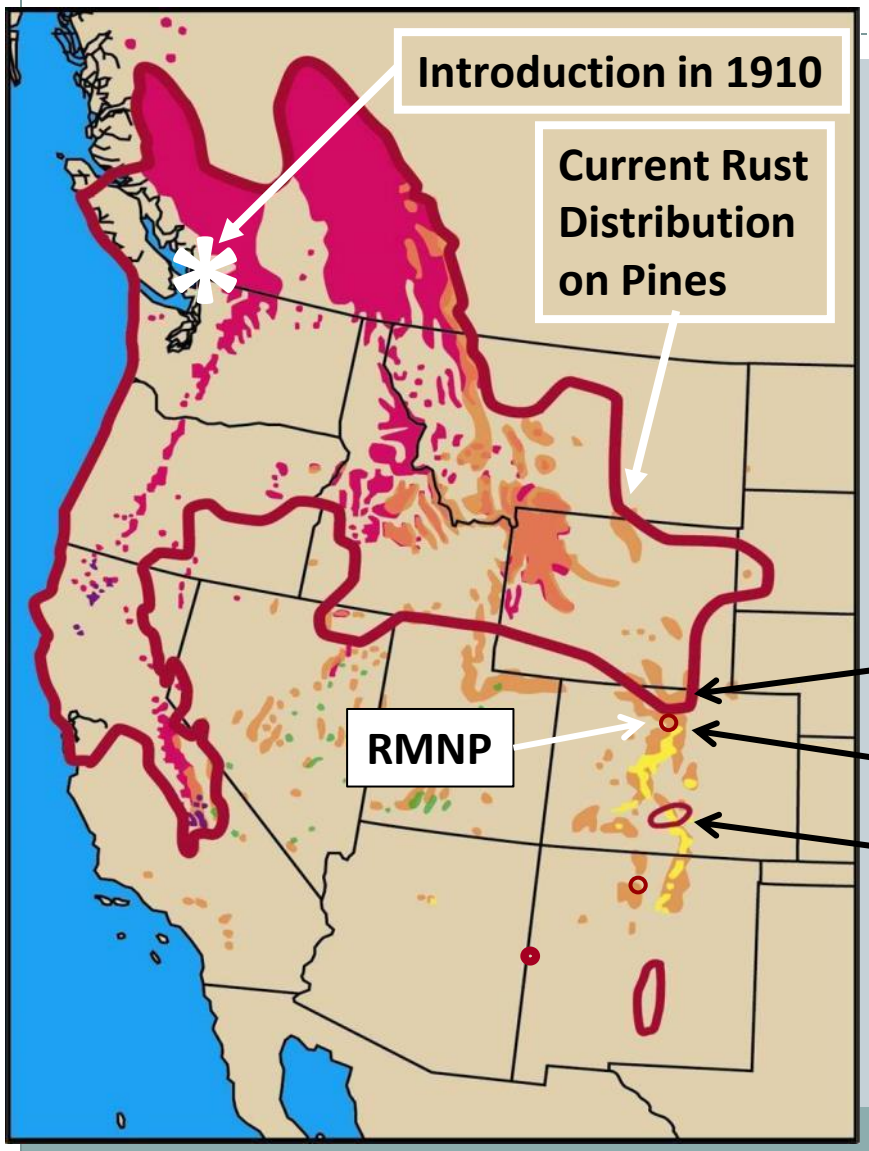
High Elevation Five-Needle Pines

Great Basin Bristlecone Pine



Foxtail Pine

White Pine Blister Rust Fungus Invades Western North America

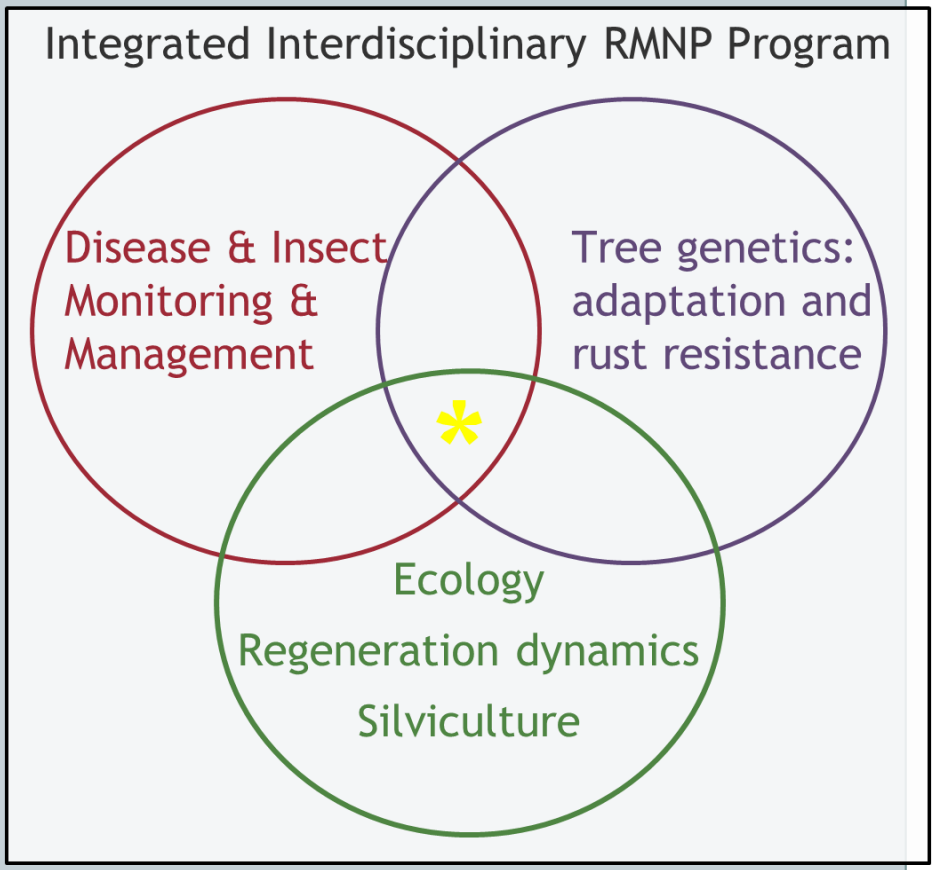


All the North American five-needle pine species are susceptible to WPBR

- ✓ Lethal
- ✓ Native to Asia
- ✓ Spores spread by air

No excuse for being surprised – Build a Science Foundation to Act

- **1998:** White pine blister rust discovered in Colorado
- **2001:** USDA FS initiated 5-Needle Pine Proactive Strategy Research Program
- **2008:** RMNP partnered with USDA FS to build a science foundation for application of the Proactive Strategy for limber pine conservation



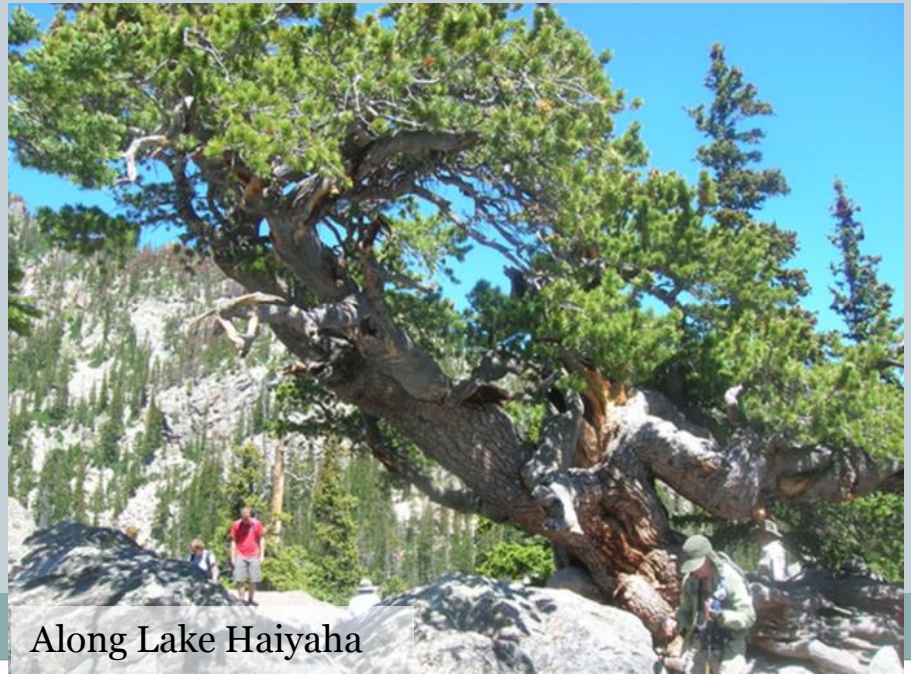
Complimented by other ongoing research

Limber Pine Conservation Strategy Objectives

- Conserve limber pine genetic diversity
- Provide science-based management to increase ecosystem resilience to novel challenges (WPBR, CC)
- Develop the park's continued role as a champion for the preservation of the genetic integrity of native flora and fauna

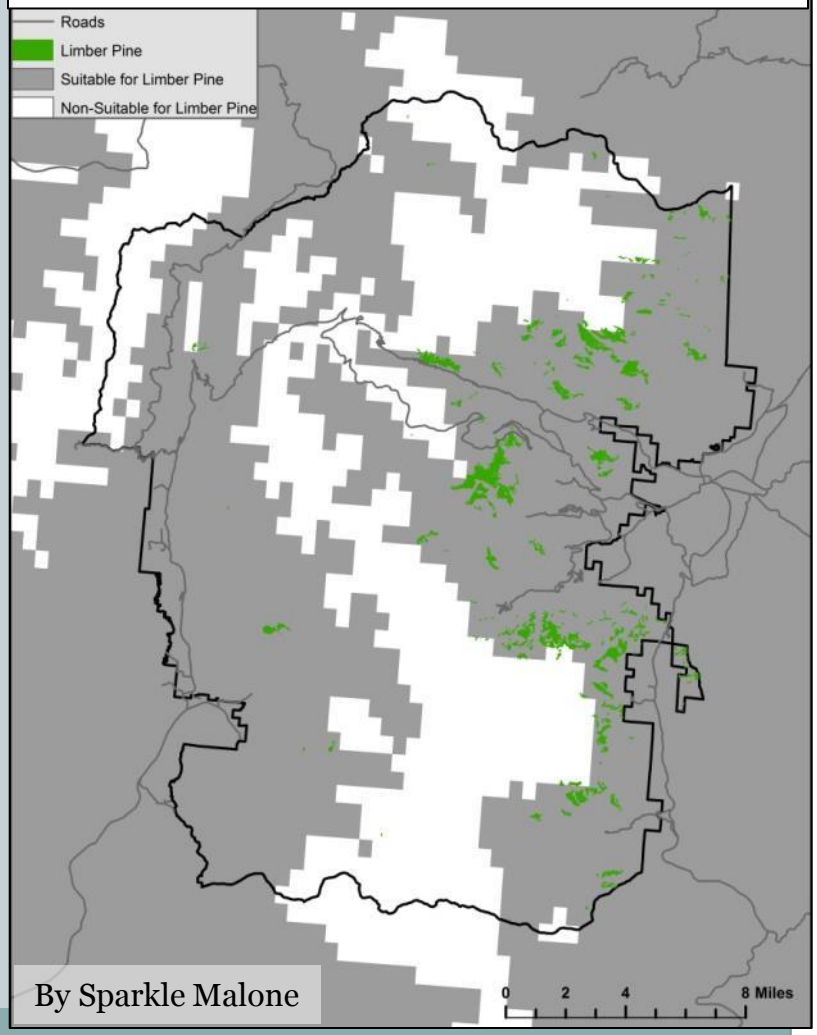
Limber Pine in RMNP

- 5,500 acres of limber pine
- Disproportionate effect on biodiversity
- ~175,000 acres of suitable habitat
- High value trees



Along Lake Haiyaha

Limber pine and Suitable habitat



Limber Pine - A Keystone Species

- Grows where other species cannot
- Defines both the alpine and the grassland treelines

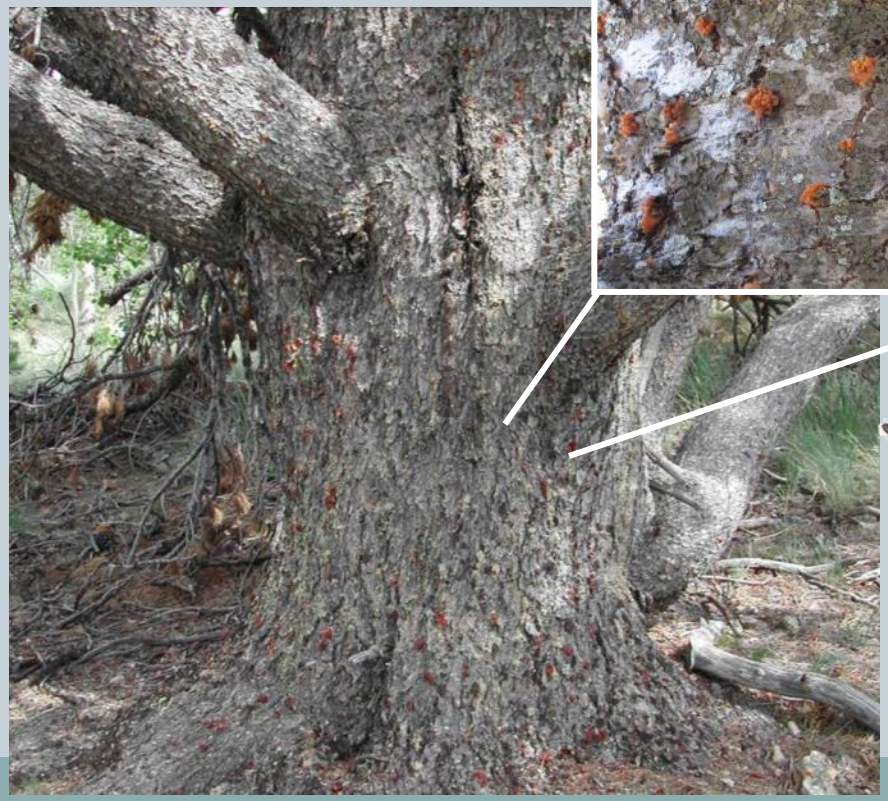
- Well adapted to natural stresses
- Not well suited for rapid adaptation to novel stresses

Limber Pine - A Keystone Species

Limber Pine – A Species of Management Concern
Native Pests

Current Condition in RMNP

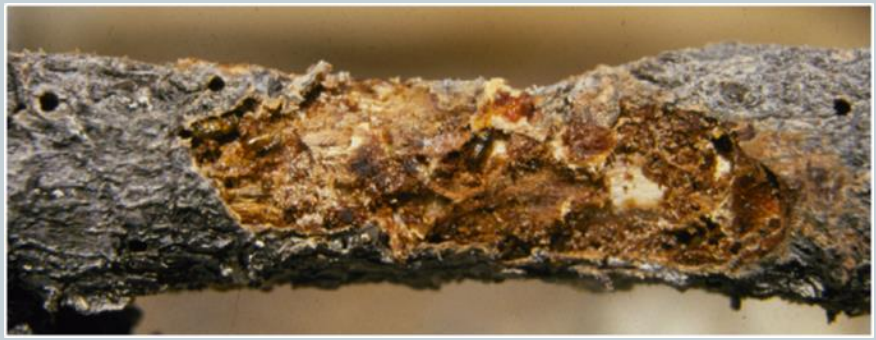
- 19% of the limber pine have been killed by mountain pine beetle
- Kills large trees



Limber Pine – A Species of Management Concern
Native Pests

Current Condition in RMNP

- **60% of evaluated study areas in 2009 had dwarf mistletoe (12% of the trees)**
- **Dwarf mistletoe = Parasitic plant**
- **Other insects**



Interactions with climate warming

→ **Greater mortality**

→ **Reduced regeneration**

Limber Pine - A Species of Management Concern
Non-Native Pathogen → White Pine Blister Rust (WPBR)

The New Arrival

- White pine blister rust
- non native, lethal disease (fungus)
- WPBR discovered in the Park in 2009/2010
- Kills trees of all ages
- Expect it to spread and intensify

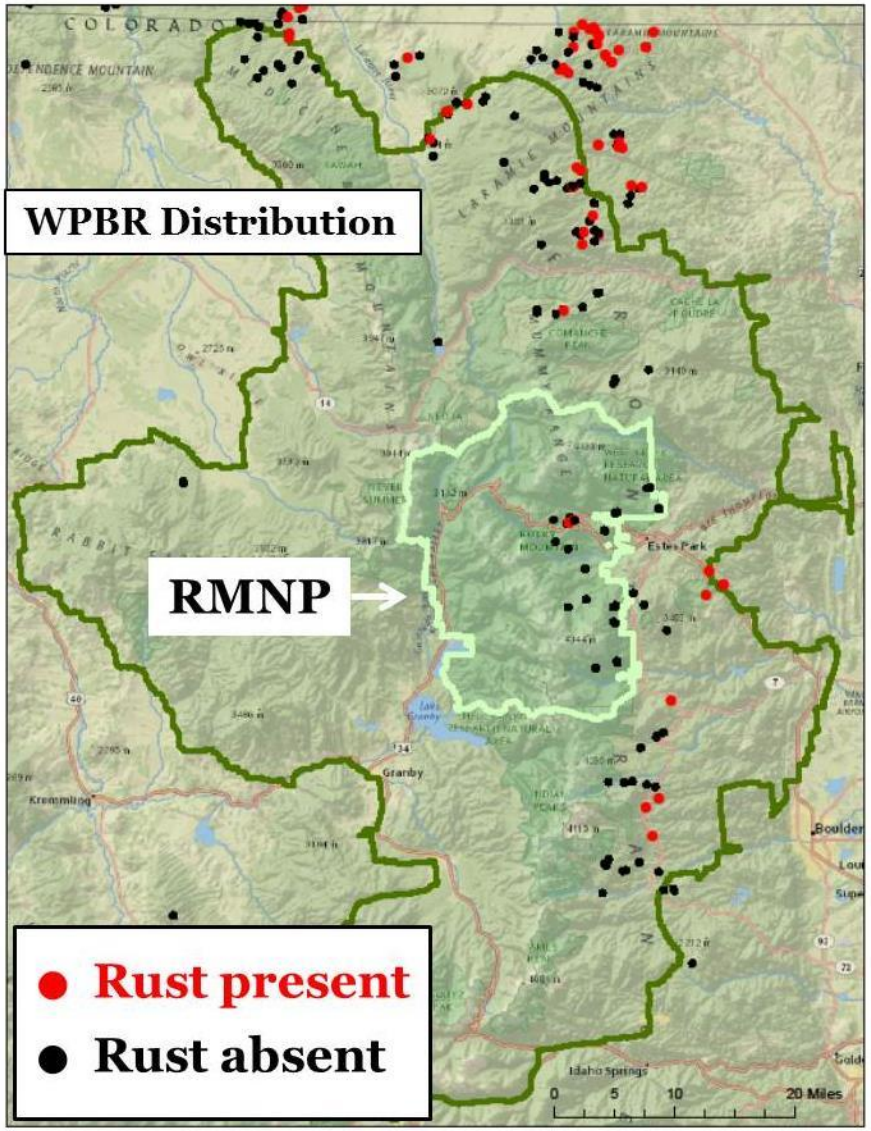
Limber Pine - A Species of Management Concern

Non-Native Pathogen → White Pine Blister Rust (WPBR)

Limber Pine = A Species of Management Concern
Interacting effects

WPBR * MPB * Mistletoe * Cone/Seed insects * Twig beetles

- Greater than additive effects
- Interactions will intensify with climate warming
- → **Expect a 40% loss in limber pine basal area over the next 15 years** (Krist et al 2014)



Learn from Experiences of Others

Whitebark pine – related species facing similar challenges:

- Endangered in Canada
- Endangered Species status (precluded) in US under ESA
- Glacier National Park: 90-95% of whitebark pine are dead; they are planting seedlings
- Conservation plans – GYE, Crater Lake NP, Alberta, Rangewide

Limber pine:

- Special Status Species on BLM land in Wyoming.
- Endangered in Alberta, Canada
- Recommended for Endangered status nationally in Canada
- Conservation plan – Alberta

Research has put and revealed RMNP in a very unique situation

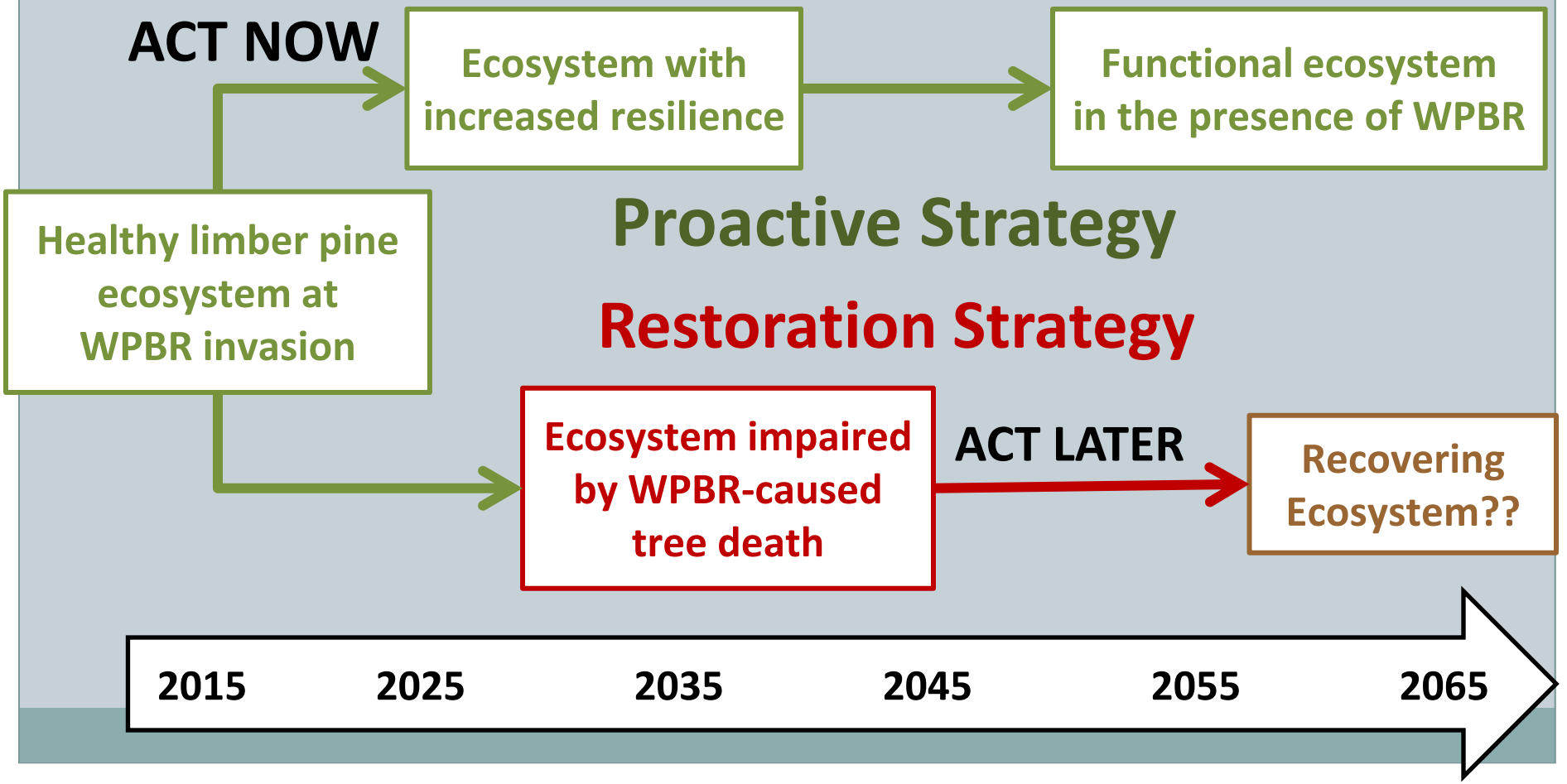
Site-specific knowledge for RMNP:

- At the invasion front for the spread of WPBR
- We have already identified natural genetic resistance to WPBR in RMNP limber pine populations
- Post-fire conditions support successful natural regeneration

Positioned well to respond to management

RMNP has a Choice

- Continue proactive management to avoid impaired ecosystem condition in the future



Limber Pine Conservation Strategy

1. *Ex situ* and *In situ* conservation - Collect seeds and protect existing trees
2. Increase the number of limber pine trees on the landscape
3. Manage to make the existing WPBR resistance stable
4. Develop & plant seedlings from WPBR resistant sources
5. Monitor limber pine health and WPBR incidence & virulence
6. Coordinate with other management actions and agencies

Thanks to all the volunteers who have helped with many aspects of the work!

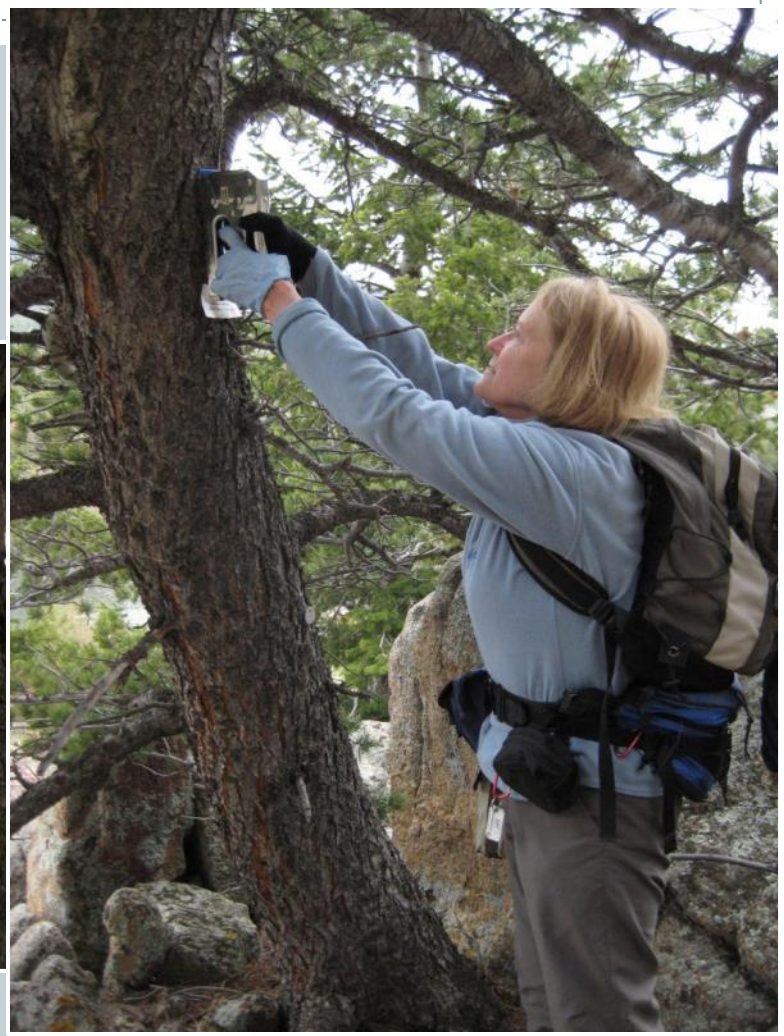
Ex situ and *In situ* conservation

- Continue to archive limber pine genetic diversity through seed collections

Ex situ and *In situ* conservation

- Continue verbenone treatments to protect trees from mountain pine beetle attack
- Protect from

fire when possible




Fern Lake Fire

Increase limber pine population size; sustain genetic diversity & disease resistance durability

- Increase the number of limber pine trees on the landscape through planting and/or direct seeding immediately to offset future mortality
- Avoid planting near streams since those areas are at high risk for WPBR
- Discourage *Ribes* planting

Develop and Plant WPBR-resistant seeds and seedlings

- Research WPBR resistance types
- Establish a seed orchard/clone bank to provide disease resistant seed for future planting

Artificial inoculation testing at USFS DGRC (Oregon)

Monitor Pines and Rust

Limber pine and forest health monitoring plots

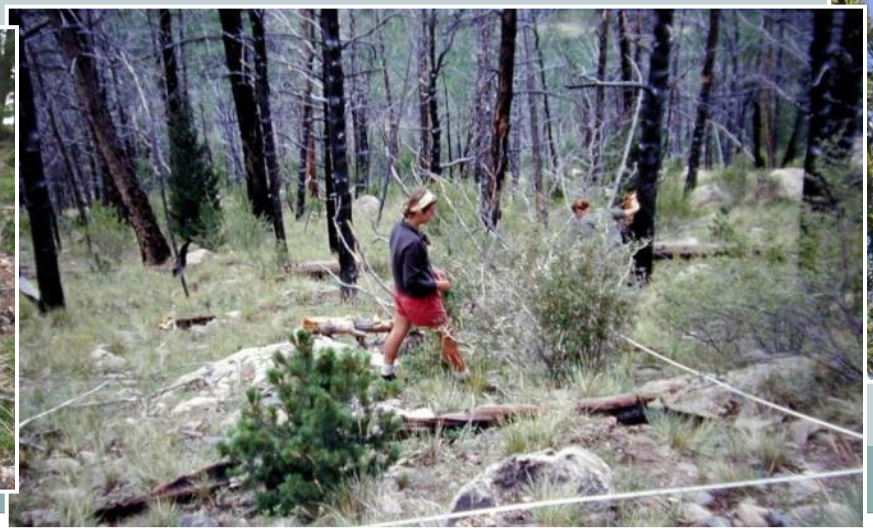
- Assess limber pine mortality and regeneration, and pests and pathogens

WPBR virulence – tree monitors

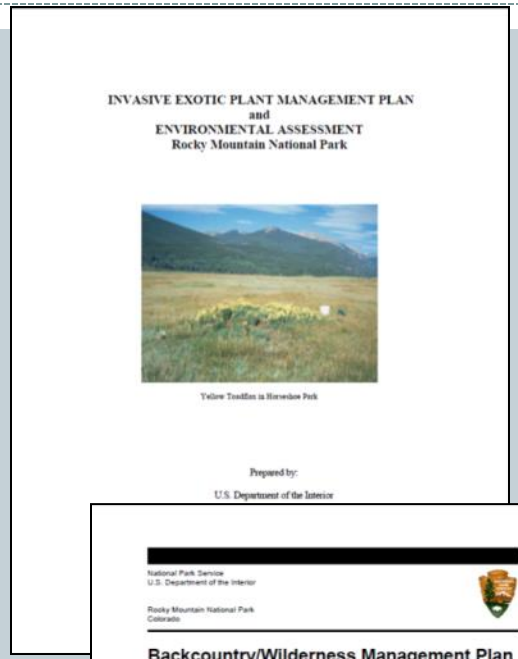
- Monitor known resistant trees for WPBR to detect when the rust has become more aggressive

WPBR Early Detection Monitoring

- Detect and monitor WPBR spread



Coordinate with other management actions, agencies, and parks


INVASIVE EXOTIC PLANT MANAGEMENT PLAN
and
ENVIRONMENTAL ASSESSMENT
Rocky Mountain National Park

Yellow Toadflax in Horseshoe Park

Prepared by:

U.S. Department of the Interior

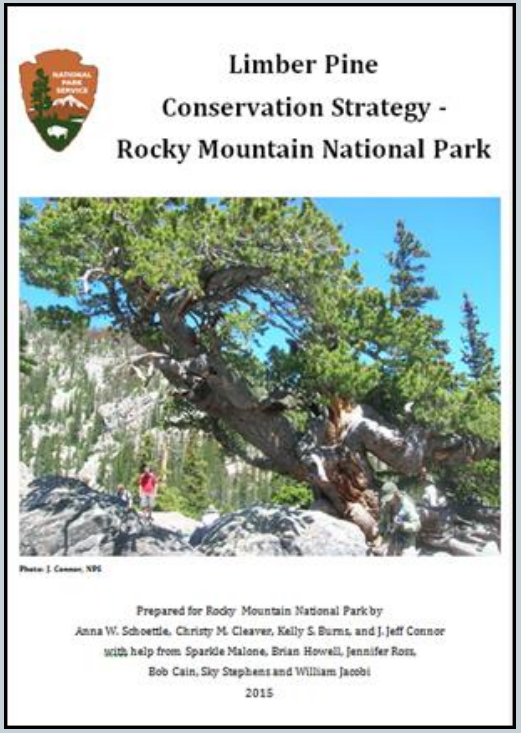

Limber Pine
Conservation Strategy -
Rocky Mountain National Park

Photo: J. Connor, NPS

Prepared for Rocky Mountain National Park by
Anna W. Schoettle, Christy M. Cleaver, Kelly S. Burns, and J. Jeff Connor
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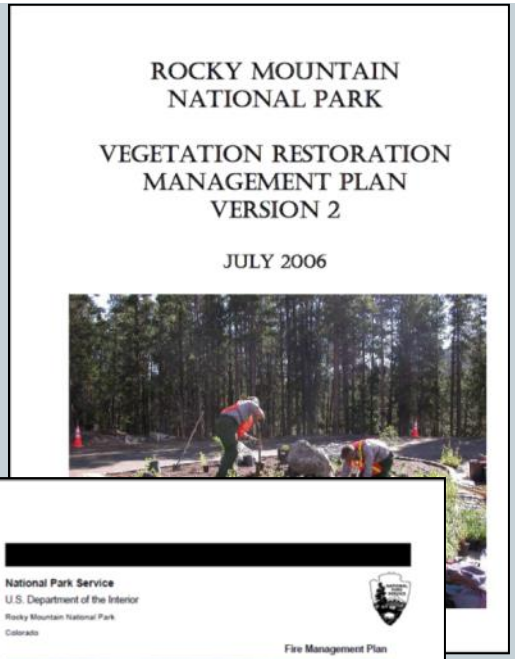
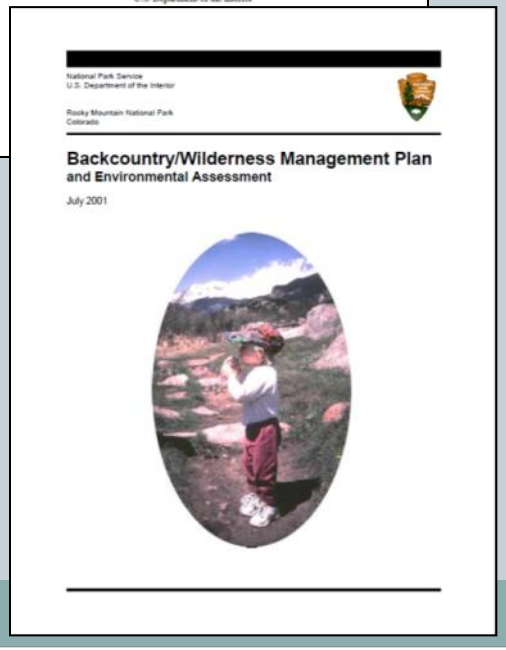
2015


ROCKY MOUNTAIN
NATIONAL PARK

VEGETATION RESTORATION
MANAGEMENT PLAN
VERSION 2

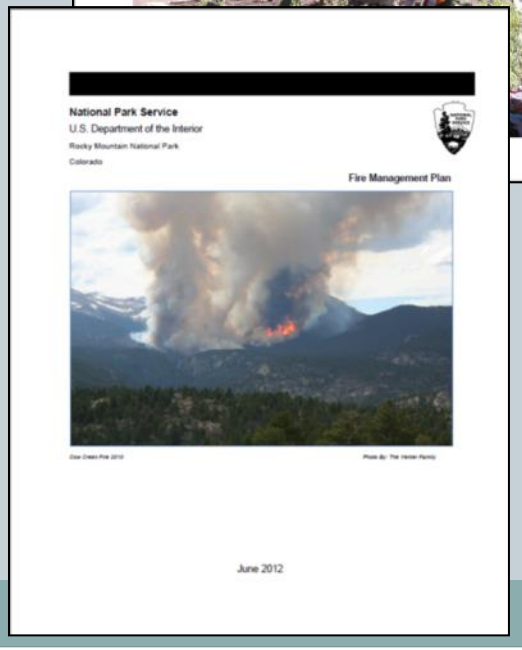
JULY 2006


National Park Service
U.S. Department of the Interior

Rocky Mountain National Park
Colorado

Backcountry/Wilderness Management Plan
and Environmental Assessment

July 2001

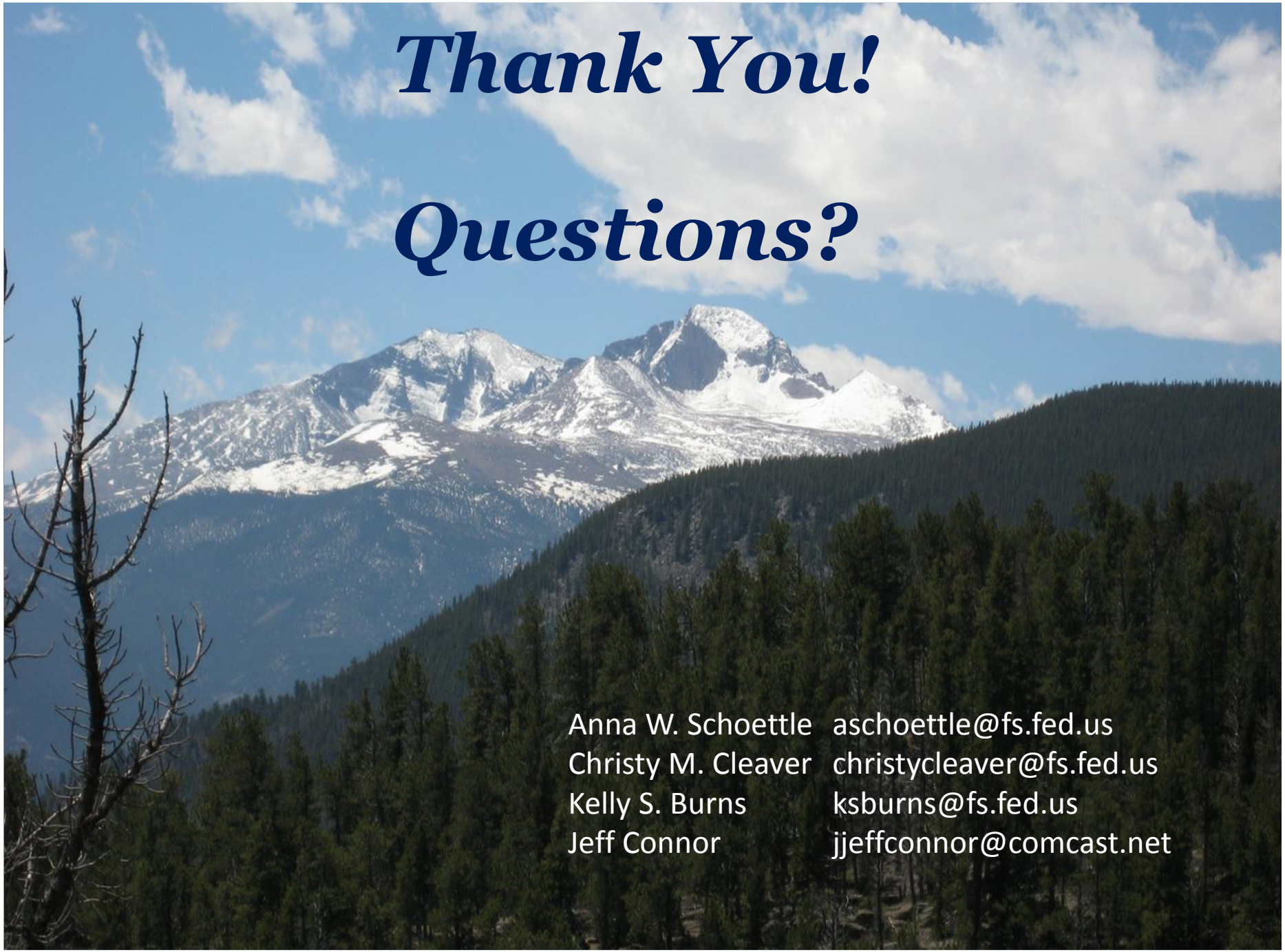

National Park Service
U.S. Department of the Interior
Rocky Mountain National Park
Colorado

Fire Management Plan

June 2012

Science behind the Scenery
Proactive Strategy: Putting a New Paradigm into Action

- RMNP is proactively conserving their limber pine populations.
- Taking the long-view of population sustainability AND choosing to act before the populations are in peril.
- Getting ahead of the crisis to increase the resilience of the mountain ecosystems to new challenges.
- Conserving the forests for future generations.


Thank You!
Questions?
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